Preamble for HIPERLAN-2

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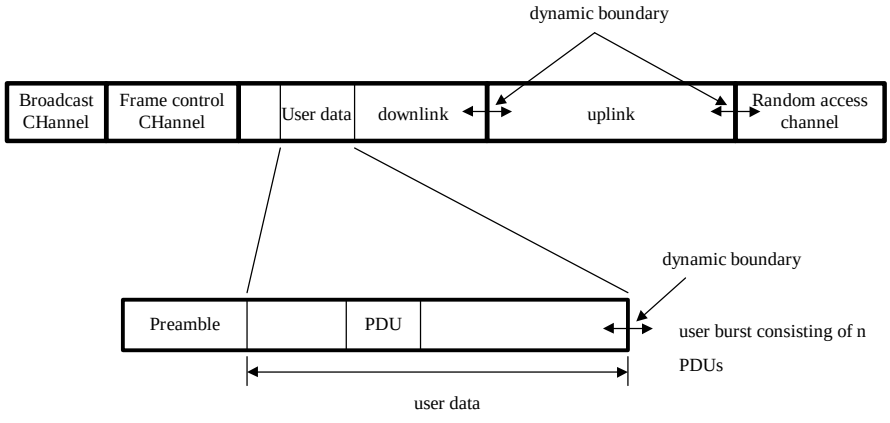
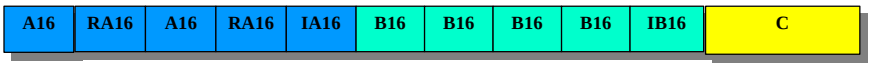
HIPERLAN-2/MMAC-WATM MAC Frame



PDU: Protocol Data Unit (54 bytes)

Downlink Preamble

- BCH Preamble



- Other Downlink Channels Preamble (FCH,SCH,LCH)

Symbol Contents

- A16/RA16 Symbol
  - ***The sign reversal of every second A16 symbol is automatically achieved by the specified subcarrier loading.***

$A16_{-26...26}$ =sqrt(2)*{0, 0, 0, 0, 1-j, 0, 0, 0, 1+j, 0, 0, 0, -1+j, 0, 0, 0, -1-j, 0, 0, 0, 1-j, 0, 0, 0, -1-j, 0, **0**, 0, 1-j, 0, 0, 0, -1-j,0, 0, 0, 1-j, 0, 0, 0,-1-j, 0, 0, 0, -1+j, 0, 0, 0, 1+j, 0, 0, 0, 0}

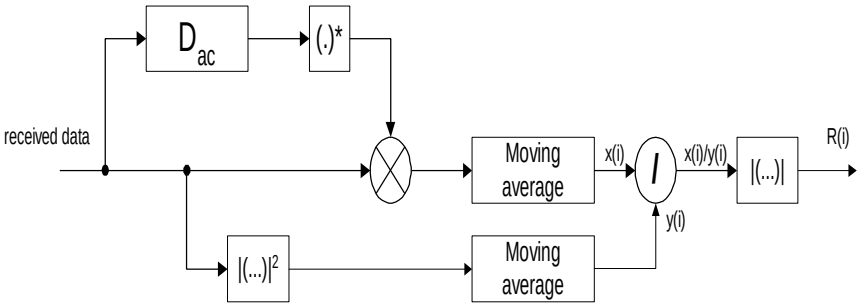
- B16 Symbol (subcarrier loading as $S_{-26...26}$ symbol in PLCP)

$B16_{-26...26}$ = sqrt(2)*{0, 0, 1+j, 0, 0, 0, -1+j, 0, 0, 0, -1-j, 0, 0, 0, 1-j, 0, 0, 0, -1-j, 0, 0, 0, 1-j, 0, 0, 0, **0**, 0, 0, 0, 1-j, 0, 0, 0, -1-j, 0, 0, 0, 1-j, 0, 0, 0, -1-j, 0, 0, 0, -1+j, 0, 0, 0, 1+j, 0, 0}

- C64 Symbol: the same content as T1/T2 in 802.11a PLCP

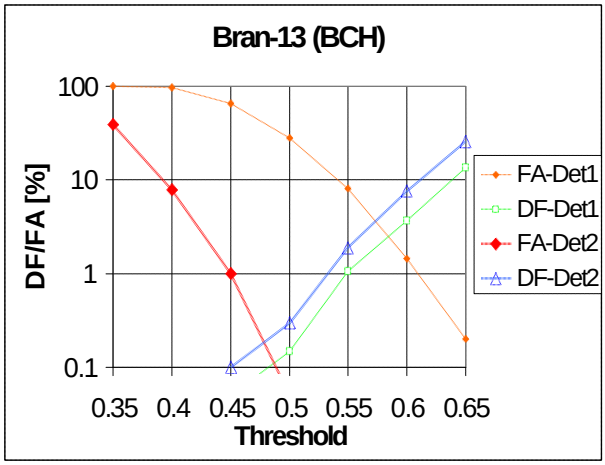
Detection-Failure and False-Alarm Rates-1

- Auto-Correlation (AC) Receiver Structure
  - ***Correlation delay D_{ac} = 16***
  - ***Moving Average (MAV) window size of AC = 48***

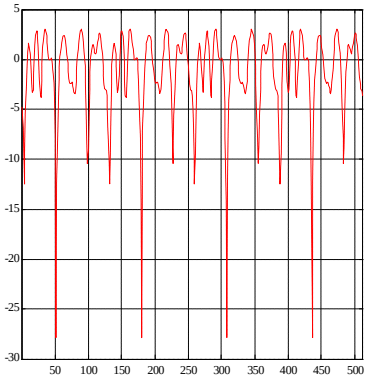


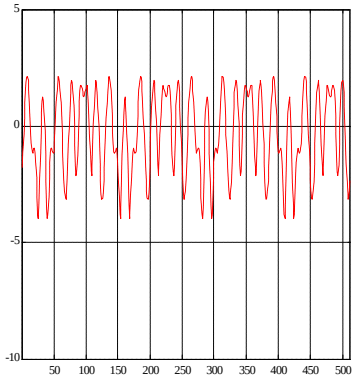
Detection-Failure and False-Alarm Rates-2

- Detector-1 **only takes the absolute value of the A-field correlation peak (as well as the phase at the peak position to verify the peak belonging to the BCH A-field) and compares it with a defined threshold**
- Detector-2 **takes into account both peaks (A-field and B-field) being above a certain threshold.**



Symbol PAPR and Dynamic Range





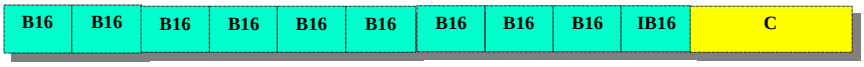
Current 802.11a symbol $S_{-26...26}$, PAPR = 3.00 dB

$B16_{-26...26}$ symbol, PAPR = 2.24 dB

Uplink Preamble

- Short Preamble

- Long Preamble (very similar to 802.11a PLCP preamble)

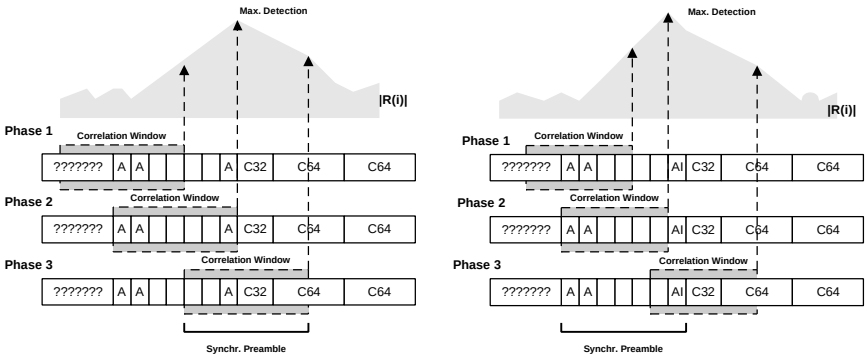


Sign Inversion of the Last Repetition

- Beneficial for
  - ***improving timing detection accuracy (sharper auto-correlation peak)***
  - ***increasing the receiver implementation flexibility (e.g. auto-correlation based or cross-correlation based)***
  - ***providing unique identification possibilities of the last short symbol repetition***

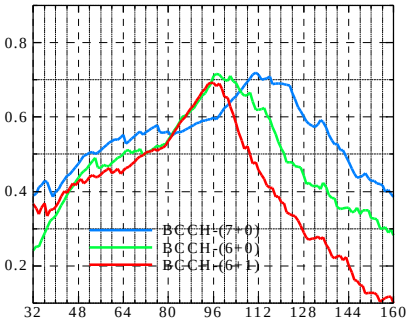
improving timing detection accuracy

- Sharper auto-correlation peak

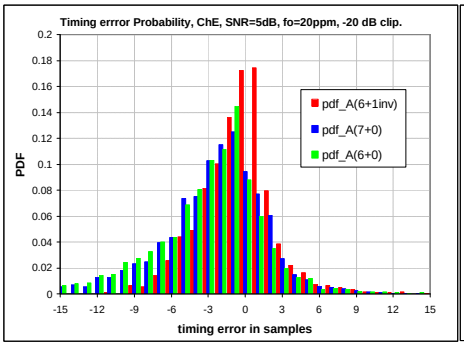


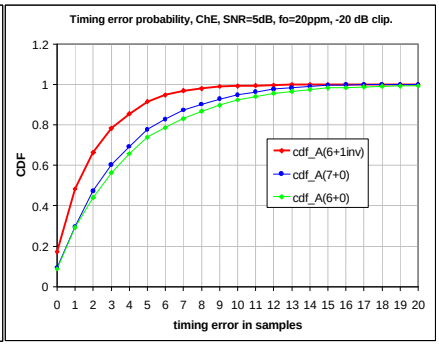
Auto-Correlation Peak

BCCH-(6+0)	A 16	A 16	A 16	A 16	A 16	A 16	C 32	C 64	C 64
BCCH-(6+1)	A 16	A 16	A 16	A 16	A 16	A 16	AI 16	C 32	C 64	C 64
BCCH-(7+0)	A 16	A 16	A 16	A 16	A 16	A 16	A 16	C 32	C 64	C 64

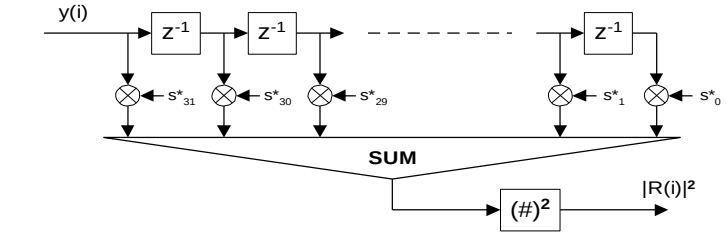


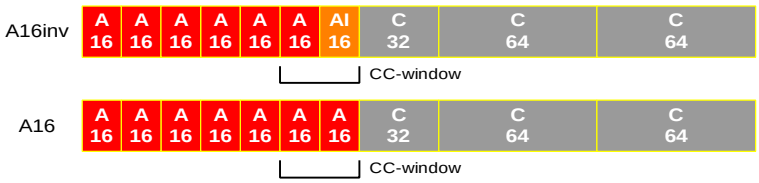
Detection Accuracy



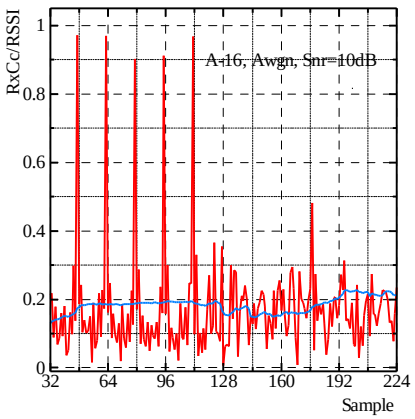


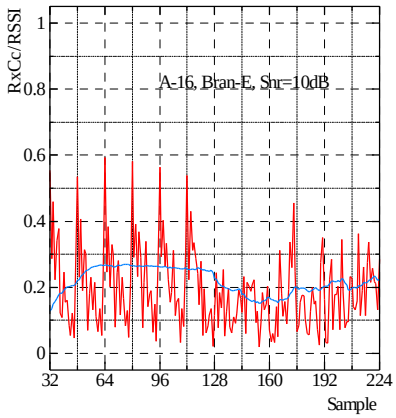
Cross-Correlation Receiver



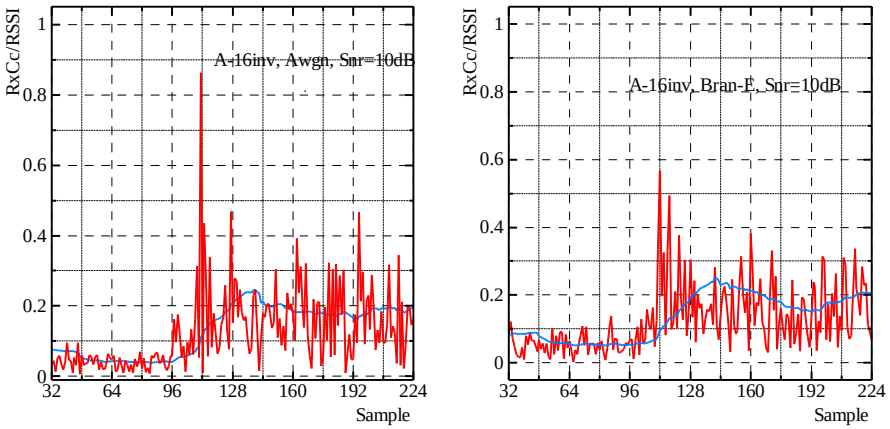


Cross-Correlation for A16



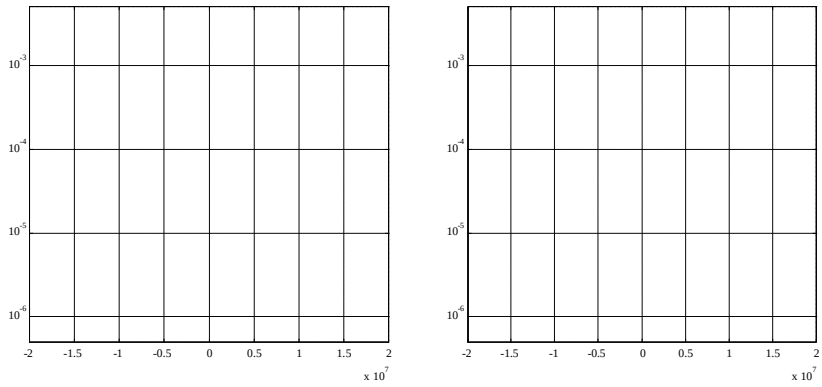


Cross-Correlation for A16



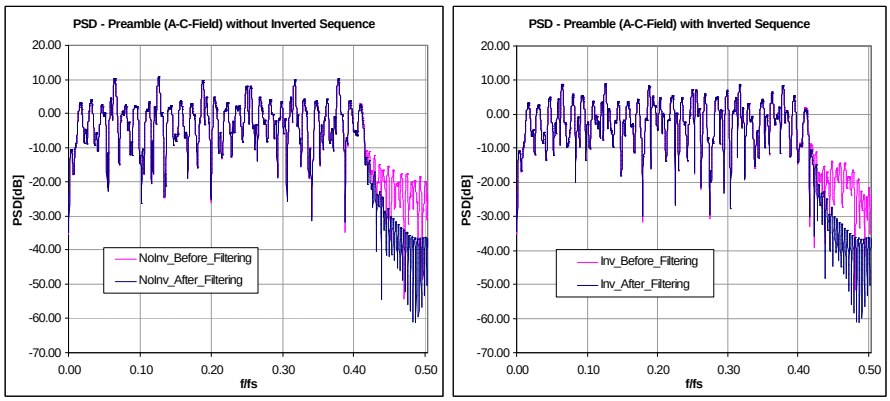
Spectrum Issues - 1

- Power Spectral Density: left (inverted), right (non-inverted)



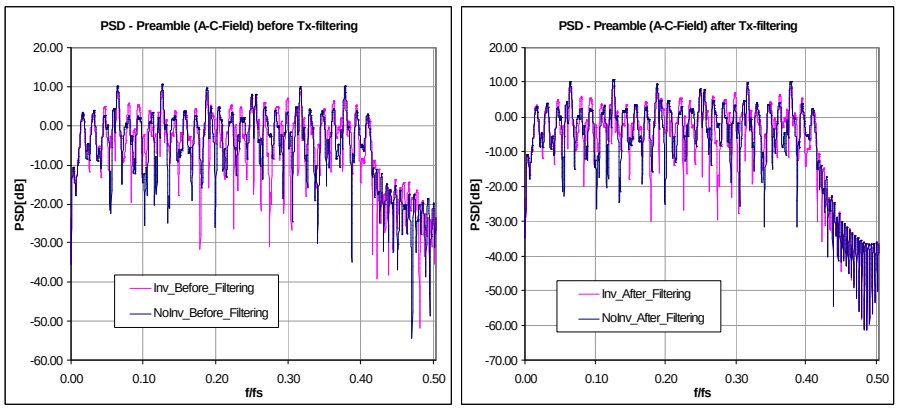
Spectrum Issues - 2

- TX signal filtering (FIR filter): only preamble
  - *8 MHz cut-off frequency, -60 dB stop-band attenuation*



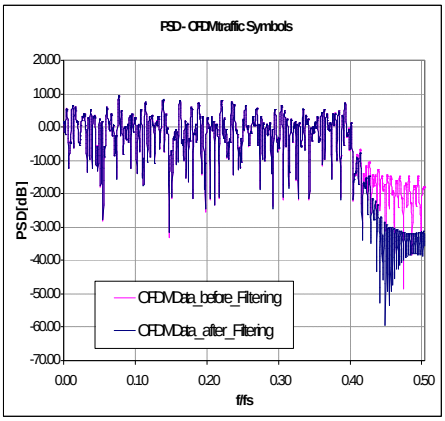
Spectrum Issues - 3

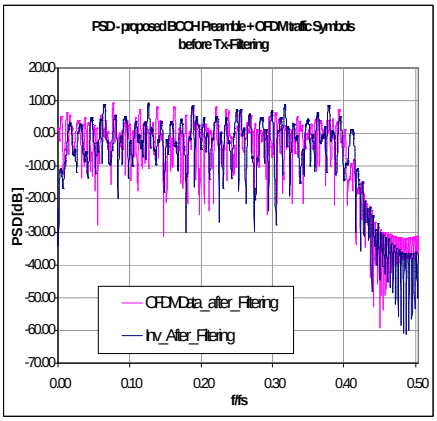
- TX signal filtering (only preamble)



Spectrum Issues - 4

- TX signal filtering: data and preamble





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